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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,473	12/27/2001	Sunghoe Yoon	8733.573.00	7768

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EXAMINER
DI GRAZIO, JEANNE A

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 09/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/026,473	YOON, SUNGHOE	
	Examiner	Art Unit	
	Jeanne A. Di Grazio	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 June 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 December 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Priority

Priority to Korean Patent Application No. 2001-25693 (May 11, 2001) is claimed.

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Cholesteric Liquid Crystal Color Filter with Hemispherical Protrusions and Associated Methods of Manufacture.

Claim Objections

Claim 9 objected to because of the following. Claim 9 is unclear. Particularly, the limitation, "a cholesteric liquid crystal layer having a plurality of protrusions on the absorption layer", can be read in at least two different ways. This limitation can be read to mean that (1) either it is the cholesteric liquid crystal layer itself that has the protrusions or (2) it is the absorption layer that has the protrusions. The Examiner interprets the claim to mean that the cholesteric layer has the protrusions and not the absorption layer. However, appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Per claim 1: Applicant claims a reflective cholesteric liquid crystal (CLC) display device that has the following elements, a first substrate, an absorption layer on the first substrate, a cholesteric liquid crystal color filter on the absorption layer, the cholesteric liquid crystal color filter having a plurality of protrusions, an overcoat layer on the cholesteric liquid crystal (CLC) color filter, a first electrode on the overcoat layer, a second substrate, a second electrode beneath the second substrate, a retardation layer on the second substrate, a polarizer on the retardation layer, and a liquid crystal layer between the first electrode and the second electrode.

Claim 1 is indefinite for failure to particularly point out and distinctly claim the subject matter which Applicant regards as the invention because the claim fails to interrelate essential elements of the invention as defined by Applicant in the specification. See MPEP 2172.01 [R-1].

There is no indication in the claim as to how the claimed elements spatially relate to one another. For example, Applicant has not identified how the substrates relate to each other with respect to the other elements claimed. While Applicant has broadly claimed that certain elements are "on" other elements, Applicant has not specifically pointed out and distinctly claimed the spatial arrangement of the various elements with respect to each other so that one of ordinary skill in the art would appreciate what is claimed.

Per claims 2-5: Because claims 2-5 depend from claim 1, they are rejected as indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as his invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 9 rejected under 35 U.S.C. 102(e) as being anticipated by Masazumi et al. (US 6,331,884 B1).

Per claim 9: Figures 1(B and C). A first substrate (5A), a second substrate (5B), an absorption layer (8) on the first substrate, a cholesteric liquid crystal layer having a plurality of protrusions (liquid crystal, 9b', protrusions 9a et seq., Col. 11, Lines 50-51), and a liquid crystal interposed between the first and second substrates (9b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 4-5 rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (2002/0047965 A1) in view of Hao (US 5,847,791).

Per claims 1 and 4-5: Suzuki has, referring to Figure 9B, a first substrate (607), an absorption layer on the first substrate (606), a cholesteric liquid crystal color filter on the absorption layer (605), an overcoat layer (616) on the cholesteric liquid crystal (CLC) color filter, a first electrode (pixel electrode, 615) on the overcoat layer, a second substrate (603), a second electrode beneath the second substrate (common electrode, 612), a retardation layer (602)

on the second substrate, a polarizer (601) on the retardation layer, and a liquid crystal layer (604) between the first electrode and the second electrode. It may be implied in Suzuki, that there are switching elements for switching first and second electrodes.

Suzuki does not appear to have a cholesteric color filter with a plurality of protrusions; however, Hao has a reflective liquid crystal display having a dispersive color filter.

In Hao, referring to Figure 4, the color filter (202) has a plurality of light scattering particles. The particles serve as light scattering protrusions. This configuration eliminates the need for a rough diffusion surface because the color filter serves as a diffuser (Col. 2, Lines 41-44). Subsequently, the invention as taught in Hao, eliminates the need for a separate diffuser thereby not only lowering cost but also viewing angle is increased and specular reflection is avoided (Id.).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suzuki in view of Hao for a cholesteric color filter serving as a diffuser that eliminates the need for an additional separate diffuser thereby lowering cost while greatly improving viewing angle and avoiding specular reflection.

Claims 2 and 3 rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (US 2002/0047965 A1) in view of Hao (US 5,847,791) and further in view of Liu (US 6,097,464).

Per claims 2 and 3: Suzuki does not appear to have a shape, size, and distribution of the protrusions controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction and a distribution of reflected light be decreased gradually within about 20% of the luminance of a front direction;

however, Liu features a series of cruciform bumps formed on a color filter substrate (Figure 3, bump structure 310). These bumps have a shape, size, and distribution (as shown in Figure 3) so that they serve to maintain a viewing angle of larger than 140^0, high contrast ratio, and high response, and small color dispersion (Col. 2, Lines 13-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suzuki in view of Liu for a viewing angle of larger than 140^0, high contrast ratio, and high response, and small color dispersion (Col. 2, Lines 13-20).

Claims 1 and 4-5 rejected under 35 U.S.C. 103(a) as being unpatentable over Osamu et al. (JP-07-239471) in view of Hao (US 5,847,791).

Per claims 1 and 4-5: Osamu has, referring to Figure 15, the common art elements of a reflective liquid crystal display - a first substrate (22), an absorption layer on the first substrate (40), a cholesteric liquid crystal color filter on the absorption layer (30), an overcoat layer (flattening film not shown) on the cholesteric liquid crystal (CLC) color filter, a first electrode (electrode not shown) on the overcoat layer, a second substrate (12), a second electrode beneath the second substrate (electrode not shown), a retardation layer (not shown) on the second substrate, a polarizer (17) on the retardation layer, and a liquid crystal layer (10) between the first electrode and the second electrode. It may be implied in Osamu, that there are switching elements for switching first and second electrodes.

Osamu does not appear to have a cholesteric color filter with a plurality of protrusions; however, Hao has a reflective liquid crystal display having a dispersive color filter.

In Hao, referring to Figure 4, the color filter (202) has a plurality of light scattering particles. The particles serve as light scattering protrusions. This configuration eliminates the

need for a rough diffusion surface because the color filter serves as a diffuser (Col. 2, Lines 41-44). Subsequently, the invention as taught in Hao, eliminates the need for a separate diffuser thereby not only lowering cost but also viewing angle is increased and specular reflection is avoided (Id.).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Osamu in view of Hao for a cholesteric color filter serving as a diffuser that eliminates the need for an additional separate diffuser thereby lowering cost while greatly improving viewing angle and avoiding specular reflection.

Claims 2 and 3 rejected under 35 U.S.C. 103(a) as being unpatentable over Osamu et al. (JP-07-239471) in view of Hao (US 5,847,791) and further in view of Liu (US 6,097,464).

Per claims 2 and 3: Osamu does not appear to have a shape, size, and distribution of the protrusions controlled to make a distribution of reflected light be uniform within a viewing angle range of about 30 degrees upward and downward from a front direction and a distribution of reflected light be decreased gradually within about 20% of the luminance of a front direction; however, Liu features a series of cruciform bumps formed on a color filter substrate (Figure 3, bump structure 310). These bumps have a shape, size, and distribution (as shown in Figure 3) so that they serve to maintain a viewing angle of larger than 140^0, high contrast ratio, and high response, and small color dispersion (Col. 2, Lines 13-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Osamu in view of Liu for a viewing angle of larger than 140^0, high contrast ratio, and high response, and small color dispersion (Col. 2, Lines 13-20).

Claims 6-7 and 10-14 rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima et al. (US 5,650,867) in view of Kuo (US 6,424,397 B1).

Per claims 6-7 and 10-14: Kojima teaches the steps of forming a color filter through exposing and developing a photoresist film (Col. 7, Lines 55-65). The photoresist in Kojima can be either a negative or positive photoresist (Example 1, Example 2, Example 4, Example 5, Example 12, Example 15). Kojima has a step of forming at least an orientation control film (Col. 5, Lines 37 et seq.). The steps of forming a photoresist layer on the cholesteric liquid crystal layer, providing a mask having a plurality of transmissive portions and a plurality of blocking portions over the photoresist, exposing the photoresist to light, removing selected portions of the photoresist, and patterning the cholesteric liquid crystal layer using the photoresist as a mask may be implied in Kojima. Kojima preferably has a ferroelectric liquid crystal exhibiting the cholesteric phase (Col. 7, Lines 47-51). It may be implied in Kojima that if the color filter is a cholesteric color filter, an absorption layer is formed on an insulating substrate to absorb excess light from the display. Kojima furthermore has the steps of forming an overcoat layer (protective film) over the color filter elements (Col. 27, Lines 49-51). Kojima next has the step of forming an ITO film (Example 16).

Kojima does not appear to have the step of forming the cholesteric color filter such that it has a plurality of protrusions; however, Kuo has the step of forming protrusions on a color filter layer and by photoresist (Figure 4E, color filter 416, protrusions 418).

Kuo has the step of forming protrusions on a color filter layer for the purpose of obtaining a wide viewing angle LCD with self-aligned protrusions for improved pixel transmittance and performance (Col. 3, Lines 20-46).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kuo in view of Kojima for a wide viewing angle LCD with self-aligned protrusions for improved pixel transmittance and performance (Col. 3, Lines 20-46).

Claim 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima et al. (US 5,650,867) in view of Kuo (US 6,424,397 B1) and in further view of Hao (US 5,847,791).

Per claim 8: Kojima does not appear to have protrusions with a rounded surface; however, Hao has a dispersive color filter with round scattering particles (Figure 4, color filter 202). In Kuo, the color filter has round protrusions for the purpose of acting as a diffuser (Col. 2, Lines 37-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kojima in view of Kuo for a color filter having rounded protrusions for the purpose of a color filter diffuser.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeanne A. Di Grazio whose telephone number is (703)305-7009. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim, can be reached on (703) 305-3492. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Jeanne Andrea Di Grazio

JDG

Robert Kim, SPE

T. Chowdhury
Primary Examiner